

Infomateriality

Short Paper

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Abstract

This paper argues for the notion of 'infomateriality' as an orientation for IS research and as an alternative to and in distinction from sociomateriality. It sees Orlikowski's relatively recent exposition of sociomateriality as developing out of her earlier work, which was heavily influenced by Giddens' structuration theory. Tracing the key philosophical tradition of process studies, through Bergson and Whitehead, and how they can be used and combined in response to Orlikowski's work, it presents its critique of sociomateriality as a springboard and justification for the idea of infomateriality.

Keywords: sociomateriality, process philosophy, ontology, Bergson, Whitehead

Introduction

Having proposed the word 'infomateriality' in my book, *Against Nature*, (Kreps 2018) this short paper is intended to set out my thinking, as it stands at the present time, concerning the meaning and impact of this term. At the time of writing, I am half way through a one-year British Academy Mid-Career Fellowship, entitled, *Understanding Digital Events: A philosophical and sociological study of virtual experience in the everyday*. My hope is that, in the composition of the monograph that is due to be the main output of the project, the term, 'infomateriality,' will become much clearer in my thinking. This short paper, then, is part of the journey towards that, and focusses principally upon what infomateriality is *not*, in the context of IS literature.

It should be mentioned, also, at the outset, that it is not the word that matters, at all, in fact, but the unfolding concept. The process philosopher Henri Bergson, whose ideas are key to this project, frequently made a point of encouraging philosophers to continually remake philosophy. John Mullarkey's final remarks, in his book *Bergson and Philosophy*, regarding this encouragement are important here: "For Bergson," he says, "philosophy is not about discovering the right expression to represent reality, be that reality a process one or not: the absolute is not comprehended simply 'by giving it a name'. On the contrary, because logical essences themselves mutate, philosophy is about creating the right expression" (Mullarkey 1999, p. 185). It is in this spirit that I approach the term, 'infomateriality.' The information systems field should also – if not indeed even more so - be continually remaking itself, and although proposing a 'new name,' I do so in the spirit that it is a modification of another one, 'sociomateriality,' and already ripe, no doubt, for further change itself; it is not the name, in other words, that counts.

What follows, therefore, is mainly on why the term 'sociomateriality,' does not, for me, accurately describe our present reality, and why I therefore propose a new term. This is then followed by a few thoughts on what it is I believe distinguishes the new term from the old, including a necessarily brief introduction to process philosophy. Lastly, then, follow a few thoughts on what I believe – thus far - the new term to mean.

Why not sociomateriality?

Sociomateriality adopts both a grounding in Giddens' structuration theory and in the 'practice turn' hailed by Schatzki et al. I agree with Giddens' support for Bergson's *durée*, but find his use of it for his theory of

action (a) lifts the concept too far up into the sociological away from its ontological significance, and (b) contributes thereby to the de-politicisation of the social in Giddens' political theory. The physical weightiness of power relations in practice, by contrast, seems better understood by Schatzki et al, whilst at the same time such practice-based discursiveness seems to fall prey to the very subjectlessness Giddens rightly fought in early poststructuralist thought.

The primary source of the concept of sociomateriality is the work of Wanda Orlikowski, and her collaborators (Orlikowski 2000; Orlikowski & Yates 2002; Orlikowski 2002). It is a fine concept and has proven extremely useful in the field, both for application and for what may be understood through critique – e.g. that of Mutch (2013), Leonardi (2013) and Faulkner and Runde (2013) and the critical realist approach they and others have taken in opposition to it. The critique that follows here is neither critical realist, nor particularly Baradian, but also in no way meant to denigrate the concept. It is simply important, when proposing a new term such as 'infomateriality,' to be clear, in the first instance, about why the term 'sociomateriality' does not suffice to express what I mean by the new term.

As Orlikowski states, "These [structuralist] models posit technology as embodying structures ... which are then appropriated by users during their use of the technology. Human action is a central aspect of these models" (Orlikowski 2000, p. 405); and elsewhere: "In this paper we explicitly integrate the notion of social practices from this literature [Schatzki et al 2001] with that of enacted structures drawn from the theory of structuration (Giddens 1984)" (Orlikowski & Yates 2002, p. 685). Foucault's delineation of discursive practices, meanwhile, is overtly lauded in Schatzki's introduction to his book: "bodies and activities are 'constituted' within practices. Foucault (1977, p. 138) for example, described how the constitution of present-day activity centrally consists in the fashioning of bodies ... within disciplinary practices" (Schatzki et al. 2001, p. 2).

There are some interesting problems and disparities, between these approaches, which highlight why I prefer not to rely on either. Giddens' structuration theory proposes objectivism and subjectivism "be reconceptualized as a duality – the duality of structure" (1984, p. xxi). Giddens borrows Bergson's term *durée* in his texts (e.g. 1984, p. 3), and claims, "An ontology of time-space as constitutive of social practices is basic to the conception of structuration." His use of the term, however, is immediately purposed to his theory of action. He professes that the analytic Anglo-American philosophy of action can "only sparingly be drawn upon," because, "acts are constituted only by a discursive moment of attention to the *durée* of lived-through experience" (1984, p. 3). Thus *durée* becomes merely a "*durée* of social activity" (1984, p. 27). Now, the concept of 'infomateriality' is similarly founded upon *durée*, but much more fundamentally than Giddens' sociology. We shall, therefore, return to *durée* in the next section.

Furthermore, although drawing heavily on Foucault's concept of surveillance, and making use of the notion of the discursive, Giddens rejects much of poststructuralism, complaining of its "fallacious assumption that if there is no pre-existing or transcendental subject there can be no subject at all" (1979, p. 47) and in this specific point I am broadly in agreement. But in this rejection Giddens' understanding of the role of power in society suffered enormously. His political project, founded upon structuration theory, has brought disaster. It has become clear, after its demise in the corridors of power, that "the Third Way is the best ideological shell of neo-liberalism today" (Hildebrand & Martell 2012, p. 188). Giddens' "depoliticization of the social" (p. 189) has endangered democracy and "democratic politics has lost its capacity to shape the discussion about how we should organize our common life" (Mouffe 2005, p. 52).

Giddens' support for a freely acting individual subject simultaneously creating and being defined by the structures of the society we live in, in light of poststructuralist understandings of the decentred subject, seem to "promote a recovery of the subject" that indeed lapses "into subjectivism" (Giddens 1979, p. 69). The entire power/knowledge matrix outlined by Foucault implies both dominance and resistance in absolutely all relations between people – power is never absent from any engagement (Foucault 1977). To suggest, then, as Giddens does, that the notion of power permeating society "implies that power is independent of human agency" is highly contestable (Giddens 1993, p. 173). I support Schatzki, moreover, when he argues that human agency must be located within a wider field of agency that also includes non-human actors (Schatzki et al. 2001; Pickering 2001). As Schatzki points out, "Objectivism alerts theorists overly fixated on human beings and their relations to the founding presence of nonhumans in human life. Humans and nonhumans ... codetermine one another" (Schatzki 2001, p. 10).

Orlikowski has chosen, in these early papers, to prioritise specific elements of structuration theory in isolation, and to disregard the notion of discursive practices that is a significant aspect of Schatzki's own work and those works that are more fully inspired by his thinking (Schatzki 2001; Pickering 2001). Schatzki does concede that, "Given [the] multiplicity of impulses, issues and oppositions, it is not surprising that there is no uniformity of approach" (Schatzki 2001, p. 2), however, I believe it is disingenuous to contend that the 'practice turn' can be used to support (especially in Schultze & Orlikowski 2004) an exclusively structuration perspective upon practices, that takes little or no account of the significance of the discursive, and less of the nonhuman.

Now, clearly, more recently Orlikowski has herself come more closely into alignment with this contention. In positing 'Situated Entanglement of Technological Performativity and Human Agency' (Orlikowski 2005) Orlikowski begins to make use of more discursive – and poststructuralist - terminologies. However, she does not support (or reference) her use of the notion of performativity, which is an interpretative understanding most closely associated with poststructuralist and postfeminist Judith Butler (2005). Butler's own notion of performativity is situated very much within the poststructuralist discussion of decentred subjects, yet in her 2005 paper Orlikowski attempts to simultaneously situate a notion of performativity within a discussion of human agency framed by Giddens. I suggest that this short piece should be considered a work in progress that follows a reading of Karen Barad's 'Posthumanist Performativity' (Barad 2003) paper which Orlikowski makes more extensive use of in 2008, in a paper in which Orlikowski acknowledges that her early more structuration work belongs to a 'Research Stream' that is quite separate – and I would argue at odds with – the 'Research Stream' to which she suggests Karen Barad's – and her newer work – rightly belong (Orlikowski 2008).

By the end of the decade, in Orlikowski (2008) and Levinas & Orlikowski (2009), Orlikowski has shifted away from the structuration basis of her early work, adopting the discursive and performative aspects of Barad's (2003) 'agential realism' understandings to deepen and broaden her notion of the sociomaterial. This shift identifiable in Orlikowski is exemplary of a wider shift not simply in the theorising of contemporary internet phenomena within IS literature, but in those phenomena examined themselves. The 'moment' of Web 2.0 has already past, now, and Orlikowski's work from the early part of the last decade can be argued as representative of approaches that sufficed to theorise it, at the time.

In sum, the structuration theories of Giddens sit uncomfortably with the poststructuralist understandings of Foucault, Butler and Barad for whom networks of power relations are far more determining of human agency, and even less so with the notions by which such complex relations are additionally embroiled with the material constraints and non-human agency of the physical elements of practices.

What distinguishes 'infomateriality'

Process Philosophy

It is in the founding ideas of early 20th century French philosopher Henri Bergson, author of the notion of *durée*, at the root of poststructuralist thought (Kreps 2016), and those of his contemporary, British mathematician and philosopher Alfred North Whitehead, father of process philosophy, that I find ontological insight for re-examining the notion of sociomateriality.

For process philosophers, in a nutshell, *the future does not exist* (Mesle 2008). Their first focus is to challenge the then prevailing orthodoxy of materialism. The primary assumption of materialist scientific rationality, that the most basic physical laws must reductively, or at least superveniently, determine the entire universe, is faced with the mind that thinks it, and proves false. There are two points here. Firstly, the historicity of the universe – that it began, and is continually expanding (Prigogine & Stengers 1985) – and the paradoxes of the subatomic – that by observing it, we determine it (Schrödinger 1944) – were both most uncomfortable breakthroughs for the scientist at the pinnacle of classical physics, Albert Einstein, for whom the universe was essentially static and permanent. By the end of his life he had had to accept both the changing universe of the astrophysicists, and the unsettling truth that his theories simply did not apply at the level of the microscopic, the domain of the quantum physicists. 19th century reductionist materialism had, perforce, to give way to something 'looser.' How loose, remains very controversial. For some, acknowledging how the emergent properties of systems negate the claims of reductionism, the supervenience by which a system's upper-level properties are seen as being determined

by its lower-level properties is as loose as they will allow. For others, as contemporary philosopher of science Nancy Cartwright has put it, such ‘fundamentalism’ amongst some scientists must be resisted: “some circumstances resemble the models we have; others do not,” she contends (2005, p. 34). In truth, we have a patchwork of laws that apply in some cases, and not in others, and there are gaps as well as overlaps. As Whitehead puts it, “There is very little large-scale understanding, even among mathematicians. There are snippets of understanding, and there are snippets of connections between these snippets” (1938, p. 46). For many the faith that all the gaps will eventually be filled remains that – a faith. Secondly, and even more fundamentally, it has become clearer and clearer that human subjectivity and agency simply cannot be set aside in the material understanding of the universe – reductive, supervenient, or patchwork. If human agency exists, it must play a part in the unfolding of the universe, and so physical laws cannot determine all that is about to come to pass; we have a say in the matter: free will exists, and thus, until we decide which way it falls, *the future does not exist* – not just on a social level, but on a physical level, too.

Bergson’s key idea is his reconceptualisation of space and time as *durée réelle*. For scientists (at least since the late 16th century) time has been a fourth dimension through which spatially defined objects move. This spatialisation however, is, for Bergson, the root of a very special problem. His approach to the real is to understand it not in static, spatial terms, but as an indivisible continuum. Our predilection for conceiving of reality in spatial terms he contends has “no other reality than that of a diagram or a symbol,” (Bergson 1908, p. 293) and it is our apprehension of duration that truly grasps the real. For Bergson time and space are not divisible in the ever-unfolding present. Such a division is needed solely as a mechanism and vehicle to enact the intellectual study of the past. Our real experience of time is one of duration, not of individual pieces of time that we may isolate and call ‘now.’ Our consciousness sits at the crest of that unfolding duration, and the seamless web of reality unfolds before it, becoming fixed matter that we can then examine scientifically after it has passed. Consciousness is here at the pinnacle and core of the real – conceived as duration – *durée réelle* – rather than as ‘static’ existence (Kreps 2015).

Alfred North Whitehead, for his part, acknowledging his debt to Bergson (1920, p. 54), sees the bifurcation of the universe undertaken by scientific practice into a world of scientific objects observed and experienced by our subjectivities, as the reification of mere abstractions into a belief in a false picture of reality. For Whitehead, such ‘misplaced concreteness’ is attached to all too many pairs of opposites by which we try to understand the world, not least object/subject, time/space. Whitehead develops a four-dimensional geometry describing the onset, unfolding, and passing of ‘events’ in a ‘structure of events’ encompassing all the components of physics, chemistry, biology, affection, memory and intention into a seamless ongoing whole. As with Bergson, Whitehead’s ‘Objective Data’ lie in the past, from whence they are gathered together into each ‘Actual Occasion’ as it unfolds, which in turn become Objective Data for the next Actual Occasion. This process philosophy approach to an undivided and moving reality, perhaps a little more intuitive and personal for Bergson, and a little more geometric and physical for Whitehead, nonetheless for both philosophers merges human experience and agency within the physical unfolding of reality, in a manner intuitively apprehended by our common sense, and at odds with several centuries of scientific abstraction.

In light of our discussion of Giddens, above, then, it will be clear to the reader that the notion of *durée* is far more closely entwined with the nature of physical reality than the strongly subjective sense in which Giddens uses it. It is of especial note, also, as regards the later poststructuralist turn, that for Bergson the choices of the experiencing ‘I’ at the heart of the *durée réelle*, whilst powerful, are inevitably constrained. “While his consciousness, delving downwards, reveals to him, the deeper he goes, an ever more original personality, incommensurable with the others and indeed undefinable in words, on the surface of life we are in continuous contact with other men whom we resemble, and united to them by a discipline which creates between them and us a relation of interdependence” (2006, p. 14). For the early Foucault, that discipline was all too suffocating. Hence, perhaps, Giddens’ rejection of Foucault, in his pursuit of a sociology built upon human agency. But in Foucault’s later writings he did indeed find room for “technologies of the self” by which one’s own personal kaleidoscope of the possible might carefully be made (Foucault 1988), and authors such as Butler who have taken this later work further have shown how we learn to narrate ourselves, albeit in ways that conform to the norms of recognition, and which thereby simultaneously “confer a certain kind of recognition on others” (Butler, 2005, p. 41). For process philosophers, subjectivity and disciplination are coterminous: neither the pre-existing human subject nor no subject at all.

Process philosophy and sociomateriality

The understanding of time in the notion of sociomateriality, moreover, it seems to me, is closer to the attitude of ‘misplaced concreteness’ of which Whitehead complains. Orlikowski and Yates (2002) devote an entire section to a discussion of the history of ideas on Time, but neglect Bergson’s and Whitehead’s key contributions. “Temporal structuring” appears, despite its attempts to short-circuit what they describe as a “fundamental objective-subjective temporal dichotomy,” (Orlikowski & Yates 2001, p. 685), as a nonetheless spatialised conception of time, laying out our activities as if upon some giant conceptual – and spatial – calendar. Orlikowski & Yates’s notions of temporal structuring, and of Orlikowski’s later scaffolded sociomateriality, in light of process philosophy, can be seen as another means to present the spatialisation of the experience of duration. This is perhaps surprising for an author originally grounded in the ‘Research Stream’ of structuration (Orlikowski 2008), but there seems little in Giddens’ theories to underline how a process ontology ultimately holds that only processes are real, and entities, structures, or patterns are ephemeral. Perhaps at issue is the broadly positivist bias of IS literature, up against which a process ontology has much to climb (Orlikowski & Baroudi 1991; Liu & Myers 2011).

Now, it is true, the ‘temporary’ and ‘emergent’ nature of sociomaterial scaffolds (Orlikowski 2006) does point towards a more processual notion of time and materiality, unfolding at the crest of the present, only understood as human and non-human, or cultural and material, when examined in the past; but as soon as we follow that direction of thought, the notion of scaffolds itself becomes part of the backward-looking and spatialised conception of what has gone, and must, therefore, ultimately, offer limited insight. Thus the ‘temporary’ and ‘emergent’ aspects of such ‘scaffolds’ are far more important than the static, spatial conception of how ‘users’ and ‘systems’ interrelate and interweave within them. Such entities and objects are not the fundamental categories of being; rather, process is fundamental, and entities are derivative of or based in process.

It will be of no surprise to the ANT-informed reader that Latour references Whitehead extensively in his work. In IS practice, then, understanding the fluid continuity of human and nonhuman ‘components’ of what have been seen in the past as systems and their users, and how ‘events’ might be seen as the central units of reality, I believe could promote a concentration upon lightweight, small, interoperable, facilitators, (e.g APIs,) in a constantly changing and open milieu with no boundaries or even any logic to its unfolding, enabling practitioners to keep up with the development of digital transformation. Systems are increasingly driven by the patching of bugs, rather than by coherent design: especially in collective development models and perpetual beta approaches, each new version reveals a new set of bugs, discovered through use, which, in their patching, open up new functionalities and new problems, and new bugs (Gregg 2010). Rather than problematic this mode of development should perhaps be seen as both practical and in keeping with a more processual – and patchwork – ontology.

The notion of ‘sociomateriality’ given to us by Orlikowski, then, is insufficiently durational to capture the encompassing flow of process philosophy. One wonders what depth her ‘temporal structuring’ might have gained through a reading of Whitehead’s four-dimensional geometry. The human subject of Giddens’ world sits, after all – perhaps through its rejection of the poststructural discursive – too close as a concept to the Enlightenment subjectivity to which objective reality is made manifest: precisely the division at the heart of the bifurcation against which Whitehead protests, entrapped by the intellectualization of reality Bergson enjoins us to see past. Human action *within* a processual reality, in other words, is very different to one metaphysically beyond an objective world that happens *to it*. The significance of power relations, moreover, and the political ramifications of structuration and its depoliticization of agency, render ‘sociomateriality’ dangerously inert for a critical information systems approach.

What do I mean by ‘infomateriality’, then?

The world of cybersociety, of the digital, of the virtual spaces that link us and the material culture we live in, have become so enmeshed and interdependent that we have embarked upon what might be described as an ‘infomaterial’ experiment. The era of ‘big data’ – which is lots of our ‘little data’ – increasingly promises hitherto impossible insights into material and social phenomena such that information is no longer merely a social descriptor: the information society, like anthropogenic climate change, is changing the face of the Earth. Our engagement, as a species, with the huge explosion in information in our societies, is responsible for both an acceleration and destabilisation of the kinds of global flows of material

identified by Wallerstein (1974). Information flows and the remodelling of landscapes are increasingly interwoven. To quote but one example, take food gentrification, where, the fashion for avocados in the developed world is a direct cause of deforestation in Mexico (Bravo-Espinosa et. al. 2014). The ascendancy in the United States of climate change denial, arguably as a combined result of Russian cyberwarfare and the disinformation campaigns of right-wing billionaires (Cadwalladr 2016) may lead to 80,000 more deaths per decade as its “attack on science” lifts the restrictions that prevented toxic chemicals entering the environment (Cutler and Dominici 2018). Information and materials, in other words, interrelated since the birth of civilisation, are becoming interwoven in ways far more complex and interdependent than ever before envisaged.

More profoundly still, this increasing interconnection of information and materials opens up new possibilities for understanding our role in the constitution of reality itself. Michael Epperson, in his recent book, (2004), suggests that Whitehead’s four dimensional geometry constitutes a fourth - and better - description of reality than the three competing views in quantum mechanics: (i) that reality is basically particulate, with wave-like properties, (ii) that reality is basically wave-like, with particulate properties, and (iii) that nature is not “capable of fundamental characterisation at all” (Epperson 2004, p. ix). The fourth approach is to focus, of course, on becoming, rather than being, as Whitehead does in his philosophy of events, created at the same time that Einstein (i), Schrödinger (ii) and Bohr (iii) were creating their own views. Wave-particle duality and quantum uncertainty, long thought separate problems, have recently been shown to be, in fact, the same ‘mystery’. It turns out that the mathematics of “entropic uncertainty relations,” can be reformulated to describe wave-particle duality as well (Coles et. al. 2014). Now, the moment you have a wave – whether pre- or post-particulate – you have a duration; a wave unfolds, and can only exist in time; matter, in short, ceases to be static, and objects cease to be discrete: precisely as Bergson and Whitehead had characterised them. Louis de Broglie, the quantum physicist who pushed Max Planks’ insight into the wave/particle duality of photons further, to show how *all* sub-atomic particles exhibit the same duality, believed Bergson could be regarded as having intuited many of the discoveries of the later quantum physics. Speaking of Bergson’s *Time and Free Will*, de Broglie says: “this essay, its author’s doctor’s thesis, dates from 1889 and consequently antedates by forty years the ideas of Niels Bohr and Werner Heisenberg on the physical interpretation of wave mechanics” (de Broglie 1969, p. 47).

Now, as Karen Barad points out, the essential difference between Bohr and Heisenberg was that, “For Bohr, what is at issue is *not* that we cannot *know* both the position and momentum of a particle simultaneously (as Heisenberg initially argued), but rather that particles do not *have* determinate values of position and momentum simultaneously” (Barad 2007, p. 19). The uncertainty and duality are not merely aspects of our ignorance, for Bohr: our interaction *constitutes* what we discover. This is, in short, ontology, not merely epistemology. My contention, however, is that Barad’s “shift from a metaphysics of things to phenomena” (Barad 2007, p. 33) does not go far enough. Despite her assertion that “a lively new ontology emerges” (ibid. p. 33) Barad fails to mention either Bergson or Whitehead, whose philosophical positions seem to underpin what she is saying, and yet with greater clarity.

With information and materials thus so intimately interwoven, we are led toward foundational questions about just exactly what is information, and how it may be understood - as I suggest it can - as materiality. Our use of the word ‘information’ stems from the rather anthropomorphic language the founding computing engineers seemed rather fond of. As Checkland pointed out, instead of ‘memory’, pioneers von Neumann and Turing “could perhaps, have justified the alternative metaphor ‘storage’” (1988, p. 239). Checkland insisted, moreover, that “signal transmission theory” would have been a more accurate description than “information” (1988 p. 240). In general, interpretivist IS stresses the difference between “data” and “information,” (Ackoff 1999, p. 170) the former being, for example, merely letters or integers, M, V, X, or I; the latter, when such bits are gathered into *meaningful* sequences: MMXVIII. Thus, “information” is something *by nature* incorporating human understanding, meaning, history and also communication, in ways signal transmitted data do not. Meaning in this sense, indeed, is *causal* (Markus and Rowe 2018).

Laudable attempts in IS scholarship to push the definition of information beyond the 1940s formulation have been made in the 1990s (Lee 1994; Ngwenyama and Lee 1997) and since (Gregor 2006; Hassan 2013). As Gregor puts it, however, when it comes to ontology, in IS “there is scanty recognition that these questions are even of interest” (Gregor 2006 p. 612). Information systems, I would argue, on an

ontological level, are bound to the material “motor accompaniment” of computing hardware, cabling, and the waveform behaviors of subatomic particles, but not governed by them, just as, for Bergson, our psychical life, while bound to its biological motor accompaniment, is not governed by it (1908, p. 83). Bergson’s model of the universe, as we have seen, is one based upon consciousness, for to exist today, consciousness must, perforce, have been inherent in the universe from the outset as a possibility, and thus implicit in the foundations of existence. Duration, as Bergson sees it, gives not only meaning to this existence, but moments of choice where those who experience duration also direct it, and *constitute* it. The material, in this manner, is underpinned and directed by meaning - not in the sense of idealist philosophy, where the universe all exists in the mind, but in the sense that mind and matter are two sides to one coin, a universe composed of both, wherein meaning comes from the conscious. Thus, an ontology of meaningful information, and the data exchange associated with it, is that the material is not something separate, but something inherently a part of our experience of existence, and that experience is as much a part of Nature as the ground beneath our feet. Meaningful information, moreover, as underscored at the beginning of this section, in our current age, is shifting such vast amounts of material around the world, that our geologists have declared us as living in the Anthropocene (Crutzen 2002) - an epoch in which our world is so fundamentally remade by human activity that our impact must be incorporated into our understanding of its reality.

In this sense, then, information can be considered *increasingly* material. Meaningful information is created and shared by us, continually adapted by us, and increasingly, as digital transformation unfolds and artificial intelligence rises to remake our world as fundamentally as steam, it is within information systems that we live. Information systems are fundamentally embedded in both social and infrastructural systems, and fundamentally about communication – from mind to mind, and from autonomous systems to other autonomous systems. Like sleeping policemen, for all their physicality, such autonomous systems are still messages, statements within the social, means by which we rise above automaticity and establish the freedom to be other than chained to the requirements of necessity. It is in the manufacture of such tools, in invention *per se*, for Bergson, that the intellect distinguishes itself from instinct. This is what makes us human and not animal: “we should say not *Homo sapiens*, but *Homo faber*,” he tells us, defining intelligence as “the faculty of manufacturing artificial objects, especially tools to make tools, and of indefinitely varying the manufacture” (Bergson 1944, p. 153). The robots set to make the information systems that will move materials around for us in the near future, are just such tools to make tools.

Thus the “cybersociety,” envisioned by 1990s cyberpunk writers (e.g. Gibson 1993), seems already upon us: the latest industrial revolution (Schwab 2016) of robotics and AI seems ripe to take us a yet further step into a world made for us and by us, away from the natural habitat of our evolution. Machine ‘learning’ and artificial ‘intelligence’ (more anthropomorphisms I have critiqued elsewhere – Kreps 2017) and the augmented realities that are fast approaching, promise an almost completely intermediated world. In this – and many other - senses, information systems are become key to our reality, determiners of what materials are, do, and are used for, as much as of who we are: in this manner as much as in any other, we live in an Anthropocene age (Crutzen 2002), and it is in this sense, in the manner in which information is physically instantiated, that I mean the term, ‘infomateriality.’

Conclusion

Infomateriality, as a term, then, is meant in distinction from sociomateriality, in the following key respects:

- it does not try to merge two ‘opposites’ – the social and material – founded, as it is, in an ontology that does not distinguish between them so fundamentally. Rather, like sociomateriality, the term ‘infomateriality’ is indeed an attempt to overcome oppositional dualism, but not simply between information and materiality, but between subject and object, between internal and external, reason and experience, mind and body, agency and structure, organic and inorganic, Being and Becoming.
- although sharing a process ontology with Giddens’ world-view, it focuses more upon the physical, and more upon the durational flow of ‘events,’ and less upon ephemeral social ‘structures’
- although sharing relationships with quantum understandings of the universe with Barad, it acknowledges and embraces the philosophical *oeuvres* of those from whom the “shift in metaphysics from things to phenomena” arises

- unlike Giddens, it acknowledges poststructuralist networks of power relations and the mutual definition of the self in social contexts, but whilst at the same time merging such relations with the physical constraints of embeddedness, such that the two are not distinguishable for social science on the one hand, and physical science on the other
- it acknowledges the key element of human meaning already inherent within ‘information’, whilst laying stress upon the anthropogenic shift of digital transformation: that we live in a world we have made and are rapidly remaking
- it offers, then, in a way that sociomateriality does not, a perspective by which individual experience may be incorporated, alongside broader social and material conditions, in our understanding of what information is, and how its enactment is constitutive of individuals, societies, and the materiality of the world we inhabit.

Infomateriality, then, is a concept for our time. As a concept infomateriality attempts to capture – albeit perhaps inevitably briefly – a more accurate picture of the world we live in, at this time, and I commend it to any who would wish to use it, and perhaps improve upon its definition.

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